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Directive 062

Revised edition January 28, 2010

Coalbed Methane Control Well Requirements and Related Matters

The Energy Resources Conservation Board (ERCB)/Board) has approved this directive on January 28, 2010.

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Chairman

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1 Introduction

This directive details the Energy Resources Conservation Board (ERCB) requirements and issues specific to the control well process and supersedes any previous ERCB publication on control well requirements. The term "control well" is used to mean coalbed methane (CBM) control well in all instances.

A control well is established for the purpose of collecting pressure, productivity, and gas content information to allow for an understanding of gas resources in coals.

Prior to the establishment of control wells, the base data requirements for CBM wells were the same as the base data requirements for conventional gas wells. Producing CBM wells were required to have initial segregated pressure and deliverability data for each CBM pool producing from the well. Standard fluid analysis data and annual pressure surveys also were required for each CBM pool.

In 2004, a control well program began evolving through applications for approval to commingle CBM and conventional gas in the wellbore. The ERCB recognized the need to broaden the scope of the control well program to bring all CBM development under the same testing requirements. As a result, the CBM control well requirements were established in the *Oil and Gas Conservation Regulations* (*OGCR*) issued October 31, 2006. Control wells are now required for all CBM developments.

This directive does not provide details on general data collection and submission requirements that are applicable to all CBM wells (e.g., geophysical logs, well completions).

2 What's New in *Directive 062*

The January 2010 edition of *Directive 062* provides new information and concepts regarding

- an area now exempt from additional desorption control well requirements for the Horseshoe Canyon Formation and Lethbridge zone,
- deferrals, exceptions, and rescissions of control well requirements,
- exploration deferrals for the Taber and MacKay coal zones located in Development Entity (DE) No. 1,

- 30-day flow period for CBM wells before control wells are required, and
- control well coverage for horizontal and/or wet CBM wells.

3 Requirements for the Designation of Control Wells

Section 7.025(1) of the *OGCR* states that

> A licensee shall not produce gas from coal unless the Board has designated
>
> (a) a control well that is within 3 kilometres of the producing gas well, to measure pressure and production in each coal zone, and
>
> (b) a control well that is within 5 kilometres of the producing gas well, for desorption testing.

Coal is defined in Section 1.020(2)(3.1) of the *OGCR* as a "lithostratigraphic unit having greater than or equal to 50 per cent organic matter by weight and being thicker than 0.30 metres."

As indicated above, control wells are required for all CBM developments; however, effective as of January 28, 2010, no additional desorption control wells are required for the Horseshoe Canyon Formation and Lethbridge zone for CBM development deeper than 180 metres (m) below ground level in the area shown in the map in Appendix A. In this regard, the ERCB has reviewed the desorption information filed and has concluded that there is sufficient desorption information to establish a reasonable understanding of gas content for the area.

4 Minimum Testing Requirements for Control Wells

The minimum testing requirements are summarized in Table 1. Initial testing of pressure and flow control wells may be conducted before or after the designation of the control well and must be in accordance with Table 1.

The four-month initial pressure and flow testing window is intended to assist licensees to avoid conflicts with road bans, seeding, harvesting, and scheduling equipment, among other matters. The expectation is that companies should be actively planning testing programs around any restrictions without the need for extensions to the four-month testing window. Short extensions to the four-month testing window for CBM developments, addressed to welltest-helpline@ercb.ca, will be considered by the ERCB if there is a well-supported basis for the request.

Tests that carry over to the next calendar year as the result of a short extension to initial pressure and flow testing will not be considered as having fulfilled the annual testing requirements for the year the test was completed.

The ERCB does not normally grant requests for extensions to annual pressure and flow testing, as it can be conducted at any time during the calendar year. Licensees should plan test schedules to ensure that all required tests are conducted before year-end.

Licensees are required to comply with testing requirements as long as a well is an ERCB-designated control well. This includes the time period during which an application for the rescission of a control well is before the ERCB.

Failure to comply with the pressure and flow data requirements will place the licensee in noncompliance (see Section 11).

Table 1. Summary of minimum testing requirements for CBM control wells

Minimum requirement	Authorization	Timing of tests and submissions
Desorption control wells		
Desorption test (for each coal zone validated by the ERCB for the control well)	Sections 11.145(2), (3), (5), and (7) of *OGCR*	• Full desorption report is to be submitted to the ERCB within - 6 months following completion of the desorption analysis, or - 12 months following the designation of the control well, whichever occurs first. • A CD ROM of the full desorption test report and two paper copies of the summary report are to be submitted to the Section Leader, Coal and Unconventional Gas, Geology and Reserves, Energy Resources Conservation Board, 640 – 5 Avenue SW, Calgary, Alberta T2P 3G4. The report must include manometer readings, calculated gas content, all coal quality analyses, and, if applicable, scientific calibration of cuttings results to the core within the same well, same township, or an offsetting township.
Pressure and flow control wells		
Initial pressure tests (segregated pressure for each coal zone validated by the ERCB for the control well)	Sections 11.145(1)(a), (4)(a), and (6) of *OGCR*; Sections 4.9 and 7.1 of *Directive 040*	• Segregated tests are to be conducted and submitted to the ERCB electronically using the ERCB Well Test Capture system within 4 months of the ERCB validation of the control well. • The ERCB will also accept tests taken up to 12 months prior to the validation date of the control well as the initial test(s) for control well purposes.
Annual pressure test (segregated pressure for each coal zone validated by the ERCB for the control well)	Sections 11.145(1)(a) and (4)(a) of *OGCR*; Sections 4.9 and 7.1 of *Directive 040*	• Annual segregated tests are to be conducted and submitted to the ERCB electronically using the ERCB Well Test Capture system. • Annual tests may be conducted at any time during the calendar year. However, annual tests not received by the ERCB by March 31 of the following year will place the licensee in noncompliance.
Initial production test	Sections 11.145(1)(b), (4)(b), and (6) of *OGCR*; Section 7.1 of *Directive 040*	• Initial flow meter logs are to be conducted over all coal zones validated in the control well or, alternatively, initial segregated flow tests may be conducted on each coal zone validated in the control well. • Flow meter logs are to be submitted in paper format to the attention of Section Leader, Coal and Unconventional Gas, Geology and Reserves, Energy Resources Conservation Board, 640 – 5 Avenue SW, Calgary, Alberta T2P 3G4, within 4 months of the validation of the control well by the ERCB.
Annual production test	Sections 11.145(1)(b) and (4)(b) of *OGCR*; Section 7.1 of *Directive 040*	• Annual flow meter logs are to be conducted over all coal zones validated in the control well or, alternatively, segregated flow tests may be conducted on each coal zone validated in the control well. • Flow meter logs are to be submitted in paper format to the attention of Section Leader, Coal and Unconventional Gas, Geology and Reserves, Energy Resources Conservation Board, 640 – 5 Avenue SW, Calgary, Alberta T2P 3G4. • Annual tests may be conducted at any time during the calendar year. However, annual tests not received by the ERCB by March 31 of the following year will place the licensee in noncompliance.
Initial fluid analysis (may be either for a single coal zone or for combined coal zones)	Section 11.070 of *OGCR*; Sections 3.5, 4.8, 4.9, and 7.1 of *Directive 040*	• Initial analysis of each produced fluid must be conducted for the combined production stream. • A test must be conducted within 30 days of the well commencing commingled production using the DE process. • Test results are to be submitted electronically to the ERCB within 45 days of completion of the test using the ERCB Well Test Capture system.

5 Establishing and Evaluating Control Wells

5.1 Initial Considerations

CBM developers are encouraged to work together in selecting control wells in a CBM development area in order to make the control well designation process as effective and efficient as possible for all parties.

Both CBM desorption and pressure and flow control wells must be in place for any and all CBM developments, even if the CBM development is small in size (i.e., 1 to 3 wells). Control well obligations continue for the life of the CBM development that the control well supports.

Control wells are required for each CBM zone being produced regardless of other completed lithologies or commingled status of the wellbore. If existing control wells do not contain all of the coal zones planned for development in a new CBM well, additional control wells will be necessary to provide the required information for the coal zones that are not validated in the existing control wells.

A potential CBM development that consists of existing wellbores to be recompleted for CBM production will require coverage by both control well types. If desorption coverage does not already exist, it will be necessary to obtain the core or cuttings needed to ensure desorption coverage regardless of whether or not the area is completed to the maximum well density.

If a well is producing gas for safety reasons from coals that are subject to an ERCB coal mine permit, whether the mine is active or abandoned, the well does not require control well coverage. If a well is producing gas from coals from a mine that is abandoned and there is no safety reason for producing the gas, control wells are required.

A CBM well may have initial gas flow for up to 30 consecutive days without control wells being established to obtain information that would assist the well licensee with further development plans. The 30-day flow period includes the time for well cleanup. No gas may be flowed from any CBM well after the 30-day period without being in compliance with this directive. All fluids obtained from the well during the 30-day period must be reported to the Petroleum Registry of Alberta.

In determining whether a control well is required, licensees should check the ERCB lists of designated control wells (available on the ERCB Web site www.ercb.ca under Industry Zone : Rules, Regulations, Requirements : Control Well Requirements) to determine if a control well already exists that would cover the coal zone(s) to be produced or if a new control well must be established. For desorption control wells, the licensee should also see Appendix A.

Wells with preliminary validation (see Section 5.3) are identified in the desorption control well lists available on the ERCB Web site. Should such wells subsequently not pass validation upon review of the full desorption report, their validation may be revoked and the well and/or zones removed from the list of designated desorption control wells. If there is still uncertainty as to the status of a desorption control well, send a query to the ERCB Control Well Coordinator by e-mail to controlwells@ercb.ca.

5.2 Application for a Control Well

An application must be filed with the ERCB for a well to be designated as a desorption well or a pressure and flow control well. The application must be made electronically using the

ERCB Electronic Application Submission (EAS) system. No applications will be accepted in paper format.

With the filing of the control well application through the EAS system, the applicant acknowledges that all information, including geophysical logs, relating to the proposed control well will no longer be held confidential by the ERCB. The exception to this is the full desorption report, which will still retain its confidentiality, in accordance with Section 12.150(5)(a) of the *OGCR*. Any preliminary desorption reports (see Section 5.3.1) or cuttings and/or sidewall core calibrations (see Section 5.3.3) submitted in conjunction with a desorption control well application will become part of the public record.

If the ERCB has questions regarding a control well application, the applicant will have five working days to supply any required additional information. If the required information is not provided to the ERCB within that timeframe, the control well application may be closed.

5.3 Desorption Control Wells

Desorption tests are conducted on control wells to establish the in situ gas content and reservoir characteristics from the desorption profile of the coal. A desorption control well requires a full suite of geophysical logs for the well and at least one core sample for each coal zone being developed in the area. Cuttings may be used in place of core for desorption testing, provided that the cuttings test results for the coal zone can be calibrated to a core desorption test within the same well or within a well in the same township or an offsetting township.

Core or cuttings may be collected on wells with any target completion, and desorption control wells do not have to produce from the coals.

The applicant for a desorption control well does not need to be the licensee of the proposed control well, but must provide all required information.

For the purpose of Section 7.025(1) of the *OGCR*, for a desorption control well that is deviated, horizontal, or multilateral, the radiuses are centred at both the surface location of the well and the bottomhole location of the leg(s) sampled.

If any portion of a deviated well or horizontal well or any leg of a multilateral well intersects a control well radius, the intersecting well will be considered to have coverage for the zones validated in that control well.

5.3.1 Desorption Control Well Validation Process

Desorption control well applications are validated in two ways—preliminary validation or full validation. Full validation requires the desorption analysis to be complete. The ERCB Web site list of CBM Desorption Control Wells differentiates between preliminary and full validation.

Applications for either preliminary or full validation must be filed using the EAS system for a CBM desorption control well application. The appropriate box on the EAS application form must be checked to indicate whether a preliminary or full validation is being requested.

Preliminary Validation

Preliminary validation of a desorption control well allows for CBM production within a 5 kilometre (km) radius of the well (assuming the required pressure and flow control well coverage is in place) in the intervening time between preliminary and full validation.

Preliminary validation of the desorption control well using **full-diameter core** may be applied for when the full desorption report is not yet available. Preliminary validation will not be considered if the full desorption report is available.

Preliminary validation of a desorption control well using **non-full diameter-core** may be applied for when the full desorption report is not available for either the non-full-diameter core or the full-diameter core of the calibration well to which the application well will be calibrated. The ERCB expects that a full desorption report for a full-diameter core in the same well, same township, or an offsetting township will be used for calibration in preference to a full-diameter core for which the full desorption report is not yet completed.

A complete application for preliminary validation of a desorption control well must include

1) digital copies of the geophysical logs in LAS 2 format;

2) a preliminary report that includes the canister numbers, sample type (core, cuttings, or sidewall core), top and bottom depth of each sample, and date the sample was collected;

3) confirmation of access to the offsetting full-diameter core report to be used for calibration; if non-full-diameter core is being used for the desorption validation, access means a copy of the full report is readily available to the applicant and is not limited to being listed in *ST105: PVT and Core Studies Index*, which provides the locations of both confidential and non-confidential full desorption reports; and

4) identification of horizontal/multilateral wells on the control well form, as well as the following additional attachments:

    a) annotated and coloured lithological log, strip log, or drillers log with well header, including gamma ray, rate of penetration, and gas units, in PDF format for the sampled leg(s) and all other horizontal legs that have been logged, and

    b) wellbore schematic showing bottomhole location and depth of each horizontal leg.

Upon receipt of an electronic application through the EAS system for preliminary validation of a CBM desorption control well, the ERCB will evaluate the coal zones and sampled intervals, advise the applicant in writing which coal zones (all, some, or none) are validated, and include the well with validated coal zones on the ERCB Web site list of CBM Desorption Control Wells. Issuance of the control well preliminary validation and listing of the well on the Web site may not be simultaneous.

If a preliminary validation has been approved, a subsequent new application for a control well must be filed to obtain full validation once the full desorption report is available (see Table 2). Full validation is conditional on receipt and approval of the full desorption report and, if applicable, the calibration report. If the report(s) is not received within the timeframe set out in Table 2 or the desorption test fails the criteria detailed in Section 5.3.2, the preliminary validation of the control well or specific zones may be rescinded.

Preliminary validation for a desorption control well will not be retained for longer than 12 months unless an application for full validation is under review by the ERCB.

Full Validation

Full validation of a desorption control well must be applied for when the full desorption report is available (see Table 2). The full desorption report must be available to the applicant and to the ERCB at the time of application. A complete full desorption report consists of, but is not limited to, the unedited text of the report, all tables, figures, sampling program, gas-in-place calculations, and all appendices, including the raw data sheets.

A complete application for full validation of a desorption control well must include

1) digital copies of the geophysical logs in LAS 2 format;

2) a cuttings calibration report if non-full-diameter core is being used for the desorption validation; and

3) identification of horizontal/multilateral wells on the control well form, as well as the following additional attachments:

   a) annotated and coloured lithological log, strip log, or drillers log with well header, including gamma ray, rate of penetration, and gas units, in PDF format for the sampled leg(s) and all other horizontal legs that have been logged, and

   b) wellbore schematic showing bottomhole location and depth of each horizontal leg.

Upon receipt of an electronic application through the EAS system for full validation of a CBM desorption control well, the ERCB will evaluate the coal zones and sampled intervals, advise the applicant in writing which coal zones (all, some, or none) are validated, and include the well with validated coal zones on the ERCB Web site list of CBM Desorption Control Wells. Issuance of the control well full validation and listing of the well on the Web site may not be simultaneous.

Upon full validation of all zones applied for, no further desorption submissions or testing is required.

Table 2 summarizes the scheduling and submission path for desorption reports for both preliminary and full validation of a desorption control well.

5.3.2 Desorption Test Requirements

The ERCB considers CBM production to be gas produced from completions in coals, with coal defined in Section 1.020(2)(3.1) of the *OGCR* as a "lithostratigraphic unit having 50 per cent or greater by weight organic matter and being thicker than 0.30 metres." Gas produced from coals thinner than 0.30 m do not require CBM desorption control well coverage. However, a desorption test on a full-diameter core sample from a coal zone of less than 0.30 m may be used for coal zone coverage for desorption control well purposes in areas where these are the only types of samples available. Tests on carbonaceous intervals with no coal present cannot be used to validate CBM zones.

Control well validation requires desorption reports from full-diameter core samples or from drill cuttings or sidewall core that have been calibrated against full-diameter core measurements taken from the same well, same township, or an offsetting township. Desorption reports from full-diameter core samples will not be accepted for control well validation if non-coal lithologies were sampled, severe lost gas time occurred, excessive head space was present, manometer contamination or leaks occurred, or large differences existed between measured gas and total gas. Samples should be desorbed at reservoir temperature

until most of the gas is measured, and then heating or crushing can be done for the total gas volume. The results of the desorption tests must be submitted to the ERCB within 6 months of the completion of the desorption analysis or 12 months following the designation of the control well, whichever occurs first, as noted in Table 2.

Table 2. Desorption control well validation types and submission requirements

Validation type	When to apply	Timing of submission of full desorption report[1]	Timing of submission of cuttings to core calibration report[2]	Timing of submission of preliminary desorption report[2]
Full validation of full-diameter core	Full desorption report is complete	Prior to or at time of application	Not applicable	Not applicable
Full validation of non-full-diameter core (cuttings or sidewall core)	Full desorption and calibration reports are complete	Prior to or at time of application	At the time of application	Not applicable
Preliminary validation of full-diameter core	Full desorption report is not complete	Within 6 months of completion of desorption analysis or within 12 months of the control well validation, whichever occurs first	Not applicable	At the time of application
Preliminary validation of non-full-diameter core (cuttings or sidewall core)	Full desorption and calibration reports are not complete	Within 6 months of completion of desorption analysis or within 12 months of the control well validation, whichever occurs first		At the time of application

[1] Send a CD ROM of the full desorption test report and two paper copies of the summary report to the Section Leader, Coal and Unconventional Gas, Geology and Reserves, Energy Resources Conservation Board, 640 – 5 Avenue SW, Calgary, Alberta T2P 3G4.

[2] An electronic copy of any calibration report or preliminary desorption report must be attached to the EAS application for a control well.

5.3.3 Cuttings and Sidewall Core Calibration

Desorption measurements from cuttings and sidewall cores require calibration against full-diameter core measurements taken from the same well, same township or an offsetting township to qualify for control well validation. The details of the desorption analysis and cuttings calibration that the ERCB would expect to be submitted to validate a cuttings or sidewall core desorption control well are as follows:

1) *Process of sample collection:* A detailed description of the processes used by the lab to ensure that sample collection volume, chip size or sidewall core size, cleaning and sieving, canister seal timing, and sample quality determination were appropriate.

2) *Description of chip size or sidewall core size:* A detailed summary of the chip size or sidewall core size, in millimetres (mm), for each sample determined after the desorption process, preferably as a histogram of percentage of each chip size category.

3) *Rapid desorption treatment:* A description of the rapid desorption process for the sample (e.g., heating vs. crushing vs. solution) and what impact it had on the gas content results.

4) *Explanation of moisture basis in reporting:* A comparison of the dry ash-free (DAF) results to the raw uncorrected air-dried gas content (usually referred to as total gas content) results and an explanation of significant discrepancies.

5) *Point-to-point plot of gas content trend:* A graphic comparison of gas contents from all samples for all zones of the non-full-diameter core well with gas contents from all samples for all zones of all full-diameter core wells used for calibration. Uncorrected gas content values derived from the combinations of the raw "lost," "measured," and "residual" interpreted values must be plotted for this graphic comparison. This would include

   a) a plot of the cuttings or sidewall core raw uncorrected air-dried gas content (usually reported as total gas content) and adjacent full-diameter core as-received gas content (usually reported as total gas content) vs. depth, and

   b) a plot of the cuttings or sidewall core raw uncorrected air-dried gas content and the full-diameter core as-received gas content vs. ash content.

These plots must be graphically (as a point-to-point trend) represented. Linear regression is not to be used, sample data cannot be averaged, and other corrected values, such as DAF or cavings corrected, are not to be used for this plot.

Corrected values for the gas content may be plotted to assist the ERCB in its review of the application, but the required values are from the uncorrected source data.

There are a number of sample collection and desorption methods available. It is not the ERCB's intent to be prescriptive on what methods are appropriate in all cases. However, the limitations of the reliability of the gas content data need to be established to ensure that the data are representative. The ERCB does this by determining variations from a best-case sampling and testing situation set out in Appendix B. This best case is not a minimum requirement for a desorption test but is an optimum testing scenario.

For cuttings calibrations, all coal seams in the coal zone that can be sampled should be sampled to enable the cuttings calibration to be validated. Where there are more than two coal seams in a zone but only two coal seams are sampled, the results are uncertain. If drilling operations preclude the recovery of cuttings from more than two coal seams, a detailed explanation of those conditions must be included with the calibration description, and the ERCB will make the final decision on the validation. If multiple coal seams are present in the coal zone and only one coal seam in the coal zone is sampled, the cuttings calibration may not be validated, as a gas content trend cannot be established.

Applicants intending to calibrate cuttings to full-diameter core should confirm the suitability of the core for cuttings calibrations. Core may be validated as a control well with only one coal seam sampled per zone. However, validation of a cuttings well as a control well may require calibration to a well with multiple core for multiple seams. In order to show a match in trend in the point-to-point trend between the cuttings and core, more than one point per zone may be required in both wells if it is not a single-seam zone. A trend is needed to show whether the variation in the multiple cuttings results is due to sampling and lab protocols or geology.

Additional information to augment available desorption tests and support the desorption control well application, such as core photos, yield plots, regional gas content maps, pressure/gas content relationships, and other technical studies, may be submitted to the ERCB to assist in the validation of a desorption control well.

5.4 Pressure and Flow Control Wells

Pressure and productivity data from coals are required to determine CBM reserves and reservoir characteristics, including extent and continuity of the various coal zones.

Pressure and flow control wells must commence production within four months of designation and would need to remain on production in order for them to be validated control wells, except as noted below. A pressure and flow control well may not be recompleted to allow commingling with other lithologies. As a minimum, segregated pressure and flow tests must be conducted initially and annually thereafter on the coal zones validated for the control well by the ERCB.

- For vertical CBM wells completed in multiple coal zones, both the pressure data and the flow data must be collected from the same producing pressure and flow control well.
- For development in a single coal zone that is dry, only pressure testing is required to meet control well testing requirements; the flow test requirements are met by production from the same well.
- For development in a single coal zone that is wet,
  - both the pressure data and the flow data may be collected from the same producing pressure and flow control well, or
  - the pressure requirements may be met with a control well that is an observation well that is not producing, and the flow requirements may be met through the reported production from any well producing from only the coal and no other lithologies, as described in Section 5.4.3.
- For control wells with multiple laterals into a single zone, the pressure data and flow data would normally be reported to the dominant lateral of the producing control well that has been designated as the producing well.

The applicant for a pressure and flow control well must be the well licensee of the proposed control well.

For the purpose of Section 7.025(1) of the *OGCR*, for a pressure and flow control well that is deviated, horizontal, or multilateral, the radiuses are centred at both the surface location of the well and at the bottomhole location of the leg(s) tested.

If any portion of a deviated well or horizontal well or any leg of a multilateral well intersects a control well radius, the intersecting well will be considered to have coverage for the zones validated in that control well.

Additional details of pressure and flow control well test requirements are provided in *Directive 040: Pressure and Deliverability Testing Oil and Gas Wells*. All CBM developments in Alberta must follow these requirements to test CBM control wells.

5.4.1 Pressure and Flow Control Well Validation Process

Before a CBM pressure and flow control well application is submitted using the EAS system, the proposed control well must be drilled with completions in coals only and the completion records must be submitted electronically to the ERCB through the Well Records System.

A complete application for validation of a pressure and flow control well must include

1) digital copies of the geophysical logs in LAS 2 format;

2) identification of horizontal/multilateral wells on the control well form, as well as the following additional attachments:

   a) annotated and coloured lithological log, strip log, or drillers log with well header, including gamma ray, rate of penetration and gas units, in PDF format for all legs, and

   b) wellbore schematic showing bottomhole location and depth of each horizontal leg; and

3) if a control well for a wet coal zone is for pressure only, as described in Section 5.4 of this directive, an indication of this in Section 2 of the Resources Applications Schedule 1 form on the EAS system is required.

Upon receipt of the application with the supporting information, the ERCB will evaluate the well's completed coal zones, advise the applicant in writing whether the well and specific coal zones meet the control well criteria, and include the well with validated coal zones on the ERCB Web site list of CBM Pressure and Flow Control Wells, as appropriate. Issuance of the control well validation and listing of the well on the Web site may not be simultaneous.

Licensees may apply for a control well for pressure and flow before or after the well is tested, as detailed in Section 4 and Table 1.

5.4.2 Identification of Coals Through Geophysical Logs

A well must be completed in coals only in order to be validated as a pressure and flow control well. Geophysical well logs are the most common form of data available for determining lithology in a well. The open hole geophysical logs (gamma ray, caliper, neutron, density, and resistivity) are preferred for determining lithology in control wells. Coals can be recognized by characteristically high neutron/density porosity, low gamma ray, and high resistivity responses.

Coals are subject to caving while drilling, which can be identified from the caliper log. If caving prevents a clear identification of the lithology from logs, the applicant will need to provide additional information (e.g., additional logs, correlations from offset wells, core, sample descriptions) to support its case that the completed zone occurs within a coal lithology.

Where cased hole logs are used, the applicant may be required to provide additional evidence to support its lithologic interpretations if it is not clear that the perforated intervals are within coals.

5.4.3 Non-Coal Lithologies in Pressure and Flow Control Wells

To be of maximum value in assessing Alberta's CBM resources, pressure and flow information from control wells must be from the coal zones only. Accordingly, pressure and flow control wells must be completed in coals only. The ERCB considers CBM production to be gas produced from completions in coals, with coal defined in Section 1.020(2)(3.1) of the *OGCR* as a "lithostratigraphic unit having 50 per cent or greater by weight organic matter and being thicker than 0.30 metres." The identification of coals can be problematic in wells with limited log data, and perforated intervals are not always limited to strata clearly recognized as coals. The successful completion of a pressure and flow control well requires an

understanding of the distinction between the definition of a coal zone that may include all lithologies and the more restrictive coal-only completion required for control wells.

The ERCB recognizes that it is difficult to precisely identify and complete a coal-only interval that excludes carbonaceous shales. Therefore, completions within both carbonaceous shales and coals will be considered acceptable for a pressure and flow control well. However, perforated intervals should not extend into non-carbonaceous material. A small amount of completion in strata of indeterminate lithology or non-carbonaceous shales adjacent to coals will be accepted in a pressure and flow control well, but only to the extent that the ERCB is satisfied that the data are representative of the pressure and productivity of the coals only.

Completions in sandstones and other productive lithologies other than carbonaceous shales are not accepted in a control well. Therefore, where completions in these productive lithologies exist in a well proposed to be a control well, complete and permanent segregation from the coal zones must be shown in order for the well to be considered for validation as a pressure and flow control well.

6 Deferral of Control Well Requirements in Exploration Areas

As described in Section 7.025(1) of the *OGCR*, all CBM production must meet control well requirements. However, the ERCB is willing to consider the deferral of control well requirements for exploration areas. These deferrals are considered on a well-specific basis only for a limited number of wells. Exploration deferrals can provide a development option for areas that are undeveloped for the targeted CBM zones, including those using recompleted wellbores.

The ERCB will consider applications for the deferral of control well requirements for a limited number of wells targeting coals in areas where there is no development in the targeted coal zone(s) within 5 km of the exploration well. "Exploration well," for the purposes of this directive, means a CBM well in an area currently undeveloped for the targeted coal zone and is in no way related to the Lahee classification of "exploratory well." Wells requested for deferral must be licensed before the application is submitted.

The ERCB will not consider any requests for the deferrals of CBM control well requirements in the geographic area and stratigraphic interval of DE No. 1 with the exception of the Taber and MacKay coals. This is reflective of the minimal CBM development from these coals in DE No. 1.

The maximum time allowed for the deferral of control well requirements will depend on the scope of the project, but will not exceed 18 months. Deferrals may be granted for one or both control well types; however, pressure and flow testing may be specified during the deferral period. The following may also be required at an interim point during the deferral period:

- progress meeting(s),
- written summary report(s), including geological, reservoir engineering, and production data collected,
- plans regarding CBM development in the area, and
- a detailed plan on how control well requirements will be met.

6.1 Applying for Deferral of Control Well Requirements in Exploration Areas

At this time, the ERCB cannot accept applications for the deferral of control well requirements through the EAS system. Such applications must be submitted electronically by e-mail to BOS.Admin@ercb.ca and will not be accepted on paper (large files will be accepted on CD) until further notice.

The applicant must provide a detailed plan to the ERCB for approval of deferral of control well requirements that includes

1) a completed Schedule 1 (see Appendix C);
2) a statement of the type of deferral (desorption, pressure and flow, or both);
3) for pressure and flow control well deferral requests, a discussion of why the 30-day flow period (Section 5.1) was insufficient to evaluate the resource;
4) the unique well identifier (UWI) of each well for which deferral is requested, along with the well licence number, the proposed total depth, and the anticipated coal zone(s);
5) a list of the intended completions and intervals in measured depth (metres at kelly bushing [mKB]);
6) a schedule of when the wells will be drilled;
7) a statement of the current well spacing for CBM development in the area of interest;
8) map(s) showing the proposed exploration well(s) and the closest producing CBM well(s);
9) if the well(s) is drilled, digital geophysical logs in LAS 2 format on CD ROM; and
10) a list of the data that will be collected from these wells during the exploration phase, along with a timetable for the collection of the data.

    The ERCB expects that the minimum standard initial gas well testing requirements, as set out in *Directive 040*, will be met for all wells included in the deferral application, including a segregated fluid analysis and initial pressure and deliverability tests for each coal zone being produced. The data must be submitted to the ERCB, in accordance with *Directive 040.*

7 Exceptions to Control Well Requirements

As described in Section 7.025(1) of the *OGCR*, all CBM production must meet control well requirements. However, the ERCB is willing to consider exceptions to control well requirements for the specific cases discussed in the sections below. These exceptions may require the collection of some segregated coal zone data and are considered on a well-specific basis only.

A number of wells may be applied for in one application, but they must all be in the same township and range. Supporting documentation may extend beyond the township involved.

Exceptions for wells that have not been completed in the zones requested for exception will not be considered. Temporary or short-term exception or relief from control well requirements will not be considered, including those made in the interim until compliance can be achieved with a planned control well.

All applications for exception to control well requirements must be made electronically using the EAS system.

7.1 Legacy Wells

Control wells are required for all CBM production under amendments to the *OGCR* enacted on October 31, 2006. Licensees may apply for exceptions to control well requirements on the basis of legacy development for CBM wells producing prior to October 31, 2006.

Exceptions to control well requirements may be requested for legacy wells where CBM has been developed to the maximum well density allowed by existing spacing rules and no further drilling for CBM is expected. Also, legacy exceptions may apply where a well was in compliance with control well requirements under a commingling order (MISC/MU Order), but the new control well requirements in the *OGCR* placed the well in noncompliance.

A complete application for exception to control well requirements must include

1) the reason an exception is being requested, along with supporting discussion;

2) type of exception (desorption or pressure and flow); if both are requested for the same well and/or zone, two separate applications must be made;

3) a list of the UWIs of the CBM wells for which relief from control well requirements is requested, as well as the following for each well:
   a) the finished drilling date,
   b) the coal zones with top and base in measured depth (mKB),
   c) all completions and treatments to the wellbore, including dates, with top and base in measured depth (mKB) (completion records must also be submitted electronically to the ERCB through the Well Records System), and
   d) digital copies of the geophysical logs in LAS 2 format;

4) a map of the area of interest legibly showing
   a) well(s) requested for exception,
   b) CBM production wells, and
   c) the surrounding pressure and flow or desorption control well(s);

5) a list of any wells licensed but not drilled in the area, including the well licensee and the target zone; and

6) the MISC/MU Order number and a copy of the Order granted for commingled CBM production, if applicable, or the commingling application number if one was submitted and closed due to the *OGCR* amendments enacted on October 31, 2006.

If further drilling for CBM production subsequently occurs in an area where exceptions to control well requirements were granted, control wells will be required for the new wells drilled.

7.2 Other Exceptions

In some other circumstances, the ERCB will consider applications for exceptions to control well requirements on a well basis only. Such circumstances include, but are not limited to, the following:

- A well is designated by the ERCB as a farm gas well with CBM production.

- A well is in an area that has discontinuous coal zones where the extent of the coal cannot be reasonably predicted, mapped, or correlated.
- A well is in an area isolated from other CBM wells, a well has unproductive CBM completions, and/or no further CBM development is expected to occur in the area.

A complete application requesting an exception must include

1) the reason an exception is being requested, along with supporting discussion;
2) type of exception (desorption or pressure and flow); if both are requested for the same well and/or zone, two separate applications must be made;
3) a list of the UWIs of the CBM wells for which relief from control well requirements is requested, as well as the following for each well:
   a) the finished drilling date,
   b) the coal zones with top and base in measured depth (mKB),
   c) all completions and treatments to the wellbore, including dates, with top and base in measured depth (mKB) (completion records must also be submitted electronically to the ERCB through the Well Records System),
   d) productivity of the well, including any water production and its source, and
   e) digital copies of the geophysical logs in LAS 2 format;
4) a map of the area of interest legibly showing
   a) well(s) requested for exception,
   b) CBM production wells, and
   c) the surrounding pressure and flow or desorption control well(s);
5) a list of any wells licensed but not drilled in the area, including the well licensee and the target zone; and
6) for an application made on the basis of a discontinuous coal:
   a) a minimum of two cross-sections that intersect,
   b) for desorption control well exceptions, a discussion of the applicant's attempts to collect representative core or cuttings for the relevant coal zones,
   c) confirmation that there is existing control well coverage for the completed continuous coal zones,
   d) discontinuity map(s) displaying the occurrences of discontinuous coal zone(s) with well(s) requested for exception highlighted,
   e) plats showing the well(s) requested for exception and surrounding validated control well radiuses of the type of exception requested, and
   f) supporting maps and analyses describing the current understanding of CBM gas content in the area where the exception is being requested.

If further drilling for CBM production subsequently occurs in an area where exceptions to control well requirements were granted, control wells will be required for the new wells drilled.

8 Rescinding Pressure and Flow Control Wells

The ERCB recognizes that there may be circumstances favouring the rescission of a designated pressure and flow control well. Such circumstances include, but are not limited, to the following:

- There is a mechanical failure of the original control well or there is watering out of the well.
- A proposed replacement well has better vertical coverage; that is, more zones can be validated in a single location.
- A high density of designated control wells renders a designated control well unnecessary.

Licensees are expected to use forethought in selecting control well candidates to optimize coverage for their CBM developments. The ERCB will not consider substituting control wells based solely on improved areal coverage, except in developing areas. In addition, the ERCB would be reluctant to grant an application for the rescission of a control well if a well would lose control well coverage in any zone by that rescission. Further, the ERCB would not consider it acceptable for an applicant to apply for the rescission of a control well and then apply for an exception for any zone/well that would lose control well coverage due to the rescission of the control well.

8.1 Rescission Requirements

At this time, the ERCB cannot accept applications for rescinding a pressure and flow control well through the EAS system. Such applications must be submitted electronically by e-mail to BOS.Admin@ercb.ca and will not be accepted on paper (large files will be accepted on CD) until further notice.

The applicant must be the licensee of the well that is being requested for rescission as a pressure and flow control well. Only one control well may be rescinded per application.

Before filing an application for the rescission of a control well, the applicant must send notification of the proposed application to the licensees of any drilled or licensed well, with the exception of abandoned wells, regardless of completion zone or targeted zone, within the radius of coverage of the control well to be rescinded. A template letter of notification is included in Appendix D. If the notification sent does not include the information noted in the template, the ERCB may close the application without processing it. The application may be refiled after the appropriate notification has been completed.

Any objections filed in response to the notification of application and the applicant's response to the objections must be included in the application subsequently filed with the ERCB.

An application to rescind a control well requires the following information:

1) a completed Schedule 1 form (see Appendix C);
2) the reason rescission is being requested, along with supporting discussion;
3) if the proposed replacement well has not been designated, confirmation that the applicant has submitted a separate pressure and flow control well application for the proposed replacement control well and indication in Section 6 of Schedule 1 that an application to rescind a control well has been submitted with the associated application number; if this

information is not provided and the replacement well is validated prior to the review of the rescission application, companies may be required to maintain and test both control wells;

4) if the proposed replacement well(s) has been previously designated, the UWI of the proposed replacement control well;

5) a comparative table of coal zones and completion intervals (in mKB) showing the previously designated control well and proposed replacement control well(s);

6) a tabulation of the zones and wells, if any, that would lose control well coverage if the well in question is removed from the list of control wells, together with a discussion as to why the ERCB should approve the rescission of the control well if this results in the loss of control well coverage for any zone/well;

7) confirmation that notice of the application to rescind a control well has been sent to all well licensees that have wells within the radius of the current control well to be replaced, together with a summary of the results of the notification;

8) a table listing the well licensees notified and the UWIs of the wells held by each licensee;

9) a plat illustrating the well to be rescinded and the replacement control well(s) and their respective validation radiuses; and

10) confirmation of whether the application is being made as the result of an enforcement action by the ERCB and supporting documentation.

9 Identification and Reporting of Production from Pressure and Flow Control Wells

9.1 Well Fluid Status

All wells completed in coals only must report production to the Petroleum Registry of Alberta using the CBMCLS (23) fluid status code; therefore all producing CBM pressure and flow control wells must be coded CBMCLS (23).

All wells completed in both coals and other productive lithologies (e.g., sandstone) must report production to the Petroleum Registry of Alberta using the CBMOT (22) fluid status code. This code must never be used for CBM pressure and flow control well production, as these control wells must be completed in coals only.

As a result of its nonproducing status, an observation pressure control well does not require a fluid status code.

9.2 Production Pool Codes

Wells with a single coal zone completion must use the appropriate pool code.

Wells producing commingled using the DE process, including control wells, must use the DE pool code to report production (DE No. 1 – 990160 or DE No. 2 – 990260).

Wells producing commingled from coals within a DE and non-coal strata outside the DE using the SD process must use the SD pool code to report production (SD – 999360). Control well production must not use the SD pool code.

The designation of a well as a control well does not approve commingled production from the well. Therefore, if the well is producing commingled from coals outside of a DE, ERCB approval to commingle is required in order to produce CBM, and the applicable field code and the "999660" pool code must be used when initially reporting production, if the specific commingled pool code is not yet available.

10 ERCB Supporting Systems

10.1 Control Wells on the ERCB Board Order System

Effective October 1, 2007, the Board Order System (BOS) provides a searchable data layer for all pressure and flow and desorption control wells. Each control well is indicated by a circle of the appropriate radius around the well indicating the area of coverage for the well. The control well data layer can be searched by CBM zone, control well identification, licensee, and well type (desorption vs. pressure and flow). BOS provides a visual tool to enhance the official data on the ERCB Web site and is updated weekly.

10.2 Proposed Future Enhancements

The ERCB is continuing development and enhancement of the EAS system to allow improved electronic submission of applications relating to control wells.

The Desorption Control Well list and Pressure and Flow Control Well list on the ERCB Web site are being upgraded to include date of designation for control wells on a go-forward basis.

11 Compliance Assurance for Control Wells

The ERCB requires licensees to meet all initial and ongoing requirements for control wells for CBM developments. Licensees are encouraged to review their developments on an ongoing basis to ensure that they are in full compliance with control well requirements. Such compliance includes the required control well coverage in terms of area and all coal zones being developed, together with the associated tests. The list of risk-assessed noncompliances associated with control wells can be found on the ERCB Web site www.ercb.ca under Industry Zone : Compliance and Enforcement : Risk Assessed Noncompliance.

If a licensee determines that it is not fully compliant with all control well requirements, a voluntary self-disclosure of the noncompliance should be filed, in accordance with Section 6 of *Directive 019: ERCB Compliance Assurance—Enforcement*. In order for the ERCB to accept the self-disclosure, all noncompliant wells must be shut in until compliance is restored. The self-disclosures must be directed to the ERCB Enforcement and Surveillance Section, Resources Applications, by e-mail to ResourceCompliance@ercb.ca, and must include

- a list of wells completed in coals currently noncompliant with control well requirements;
- a detailed action plan, including a short-term schedule to become fully compliant with all ERCB control well requirements for CBM (e.g., specified well recompletions, locations, and dates new wells are to be drilled), using the Excel spreadsheet on the ERCB Web site www.ercb.ca under Industry Zone : Rules, Regulations, Requirements : Control Well Requirements associated with *Directive 019*; and
- a written commitment from the licensee, including the date by which it will become fully compliant with pressure and flow control well requirements and the date by which it will become fully compliant with desorption control well requirements, as well as a written commitment to remain in compliance thereafter with all ERCB control well requirements.

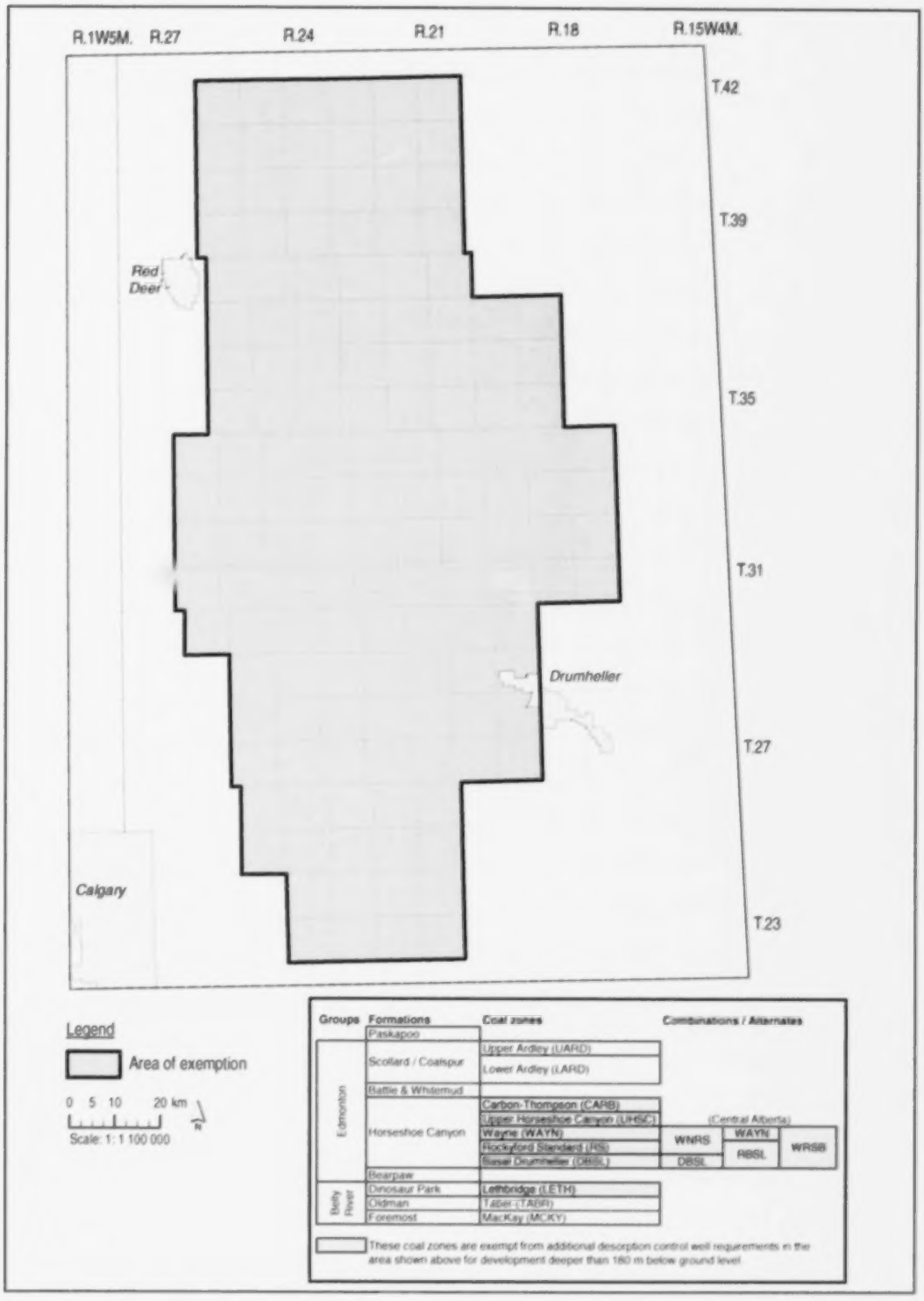
The ERCB will review the self-disclosure and action plan and, if necessary, work with the licensee to ensure that the plan will result in the licensee becoming fully compliant with control well requirements. Once the ERCB determines that the self-disclosure and related action plan are acceptable, it will issue an acceptance of the self-disclosure and plan. A licensee must not assume that the ERCB has found its self-disclosure and action plan to be acceptable until it receives confirmation from the ERCB.

Failure to meet the commitments of an action plan will result in enforcement under *Directive 019*.

A self-disclosure may not be filed after the ERCB has, through its own surveillance, determined that the well licensee is not fully compliant with control well requirements. In such cases, the ERCB will proceed with enforcement actions in accordance with *Directive 019*.

Any continual trend of self-disclosures by a licensee may result in the ERCB rejecting further self-disclosures on the basis of unfair competitive advantage relative to compliant licensees.

Appendix A Area Exempt from Additional Desorption Control Well Requirements for Specified Coal Zones



Appendix B Best-Case Scenario for Sample Collection and Desorption Testing Methods for Cuttings and Sidewall Core

Example of the best case for cuttings

- Prior to desorption testing:
  - the sample is coal only,
  - the sample is washed and sieved,
  - there is no drilling mud in the sample,
  - more than 60 per cent of the cuttings are greater than 2 millimetres (mm) in size, and
  - there is minimal lost gas time prior to placing the sample in a canister.
- During desorption testing:
  - minimal head space exists,
  - no manometer contamination or leaks occur, and
  - the rapid/quick/residual gas desorption process is conducted only after the cumulative desorption volume is less than 5 cubic centimetres (cm^3) over 150 hours at constant reservoir temperature.
- After desorption testing:
  - the float fraction is greater than 25 per cent when subjected to float sink analyses.

Example of best case for sidewall core

- Prior to desorption testing:
  - each sample is retrieved by a single trip,
  - the core is 2.54 cm in diameter by 10 cm in length or larger,
  - the canisters are sized to match the core size,
  - the core retrieval is done by percussive methods, and
  - there is no drilling mud in the sample.
- During desorption testing:
  - the rapid/quick/residual gas desorption process is conducted only after the cumulative desorption volume is less than 5 cm^3 over 150 hours.
- After desorption testing:
  - examination of the core shows less than 20 per cent deterioration to fines.

Appendix C Resources Applications Schedule 1

Schedule 1, on the following pages, applies to applications for:

- Deferral of CBM Control Well Requirements,
- Rescinding CBM Pressure and Flow Control Wells
- Shale Gas Pressure and Flow Control Well
- Shale Gas Desorption Control Well
- Deferral of Shale Gas Control Well Requirements
- Exception of Shale Gas Control Well Requirements

ERCB Energy Resources Conservation Board

Resources Applications
Schedule 1

DAY MONTH YEAR _____ APPLICANT'S FILE NUMBER _____

This applicant certifies that the information provided here and in all supporting documentation is correct and in accordance with all regulatory requirements or as directed by the Energy Resources Conservation Board.

1. APPLICANT INFORMATION

COMPANY NAME _____ BA CODE _____
CONTACT NAME _____
TELEPHONE _____ FAX _____ E-MAIL _____
MAILING ADDRESS _____

CONSULTANT COMPANY NAME _____ BA CODE _____
CONSULTANT CONTACT NAME _____
TELEPHONE _____ FAX _____ E-MAIL _____
MAILING ADDRESS _____

2. APPLICATION TYPE

(Resources Applications only accepts one application type per submission, such as Deferral of CBM Control Well Requirements, Rescinding CBM Pressure and Flow Control Well Requirements, Shale Gas Control Well Applications)

APPLICATION DESCRIPTION

3. LOCATION (Minimum input Twp/Rg/Mer)

LE	Lsd	Sec	Twp	Rge	Mer	ES	LE	Lsd	Sec	Twp	Rge	Mer	ES
					W							W	
					W							W	
					W							W	
					W							W	
					W							W	

4. FIELD AND POOL LIST

Field Name _____ Pool Name _____

5. OWNERSHIP AND NOTIFICATION INFORMATION

1. What is the ownership basis on which you make this application?

2. Has notification been conducted in accordance with the requirements for this application? Yes ☐ No ☐

2.a. If no, do you need ERCB assistance to complete the notification requirements? Please explain. Yes ☐ No ☐

3. Are there outstanding concerns? Yes (please explain) Yes ☐ No ☐

6. FUTURE APPLICATIONS

1. Have you, or do you plan to submit additional Resources Applications associated with the present application to the ERCB? Yes ☐ No ☐

1a. If yes, state the type of applications or the application numbers (if know):

Application Type	Application Number (If applicable)

Appendix D Notification Template for Pressure and Flow Control Well Rescission Applications

[Date]

[Name of Addressee]
[Title of Addressee]
[Company Name]
[Street Address]
[City, Province Postal Code]

Dear [Sir/Madam]:

APPLICATION FOR RESCISSION OF COALBED METHANE (CBM) PRESSURE AND FLOW CONTROL WELL
[UWI OF CONTROL WELL PROPOSED FOR RESCISSION]

[Company X] proposes to apply to the Energy Resources Conservation Board (ERCB/Board) for the rescission of pressure and flow control well [UWI]. Records indicate that you are the licensee of a nonabandoned well within 3 kilometres of the subject well and therefore may be affected by the rescission of control well designation for this well.

The [UWI] well provides pressure and flow control well coverage for the following zones:

Unique Well Identifier	Coal zone	Top interval (mKB)	Base interval (mKB)

Any concerns or questions regarding this application are to be directed to [company contact person and phone number], or you may send your concerns in writing to [company's address] or by fax or e-mail within 15 working days from the date of this letter.

In the absence of a response on or before [date – at least 15 working days from the date of this letter], [Company X] will proceed to file the application with the ERCB for processing.

[Company X] will discuss with you any concerns and/or objections that you may have. Should your concerns remain unresolved, they will be included as an attachment to the application when filed with the ERCB.

The ERCB application process is a public process, and all documents filed with the ERCB are placed on the public record unless otherwise authorized by the Board in accordance with Section 13 of the *Energy Resources Conservation Board Rules of Practice* and the *Energy Resources Conservation Board Act*.

After the application has been registered with the ERCB, copies can be obtained by contacting the undersigned or can be viewed electronically on the ERCB Web site at www3.eub.gov.ab.ca/eub/dds/iar_query/FindApplications.aspx .

Any questions regarding the ERCB application process should be directed to the ERCB Customer Contact Centre at 403-297-8311.

Yours truly,

[Company X]